

REMARKS

Improper Finality

Applicants respectfully submit that the Finality of the outstanding Office Action is improper. The Examiner has for the first time presented a rejection of claims 1-4, 9-12, 14-17 and 22-25 under 35 U.S.C. § 103(a) as being obvious over Hwang '303 and Nakamoto '514. This is the first time that Hwang '303 has been cited. In the outstanding Office Action, the Examiner has stated that the Applicant's amendment necessitated the new grounds of rejection. However, the Examiner apparently could have, and therefore should have, cited Hwang '303 in a non-final Office Action. That is, Applicants submit that the new grounds of rejection could have been made in a previous Office Action. To now cite Hwang '303 in a Final Office Action is improper in view of MPEP § 706.07(a).

Status of the Claims

Claims 1, 3-7, 9-14, 16-20 and 22-26 are pending after entry of the present amendment. Claims 2 and 15 have been newly cancelled. Claims 8 and 21 have been previously cancelled. Claims 1, 9, 11 and 14 have been amended.

No new matter has been added

No new matter has been added by way of the present submission. For instance, claim 1 has been amended to include subject matter taken from claim 2, now cancelled. Claim 14 has been amended to include subject matter taken from claim 15, now cancelled. Claims 9 and 11 have been amended to change dependency. Thus, no new matter has been added.

No new issues have been raised.

Further, no new issues are raised which would require additional search and/or consideration on the part of the Examiner. For instance, claims 1 and 14 have simply been amended to include subject matter taken from claims 2 and 15, respectively. Since claims 2 and 15 have already been searched and considered there is no administrative burden to enter and examine the present amendments. Thus, no new issues are raised.

In the event that the present submission does not place the application into condition for allowance, entry thereof is respectfully requested as placing the application into better form for appeal.

In view of the following remarks, the Examiner is respectfully requested to withdraw all rejections and allow the currently pending claims.

Issue under 35 U.S.C. § 112, first paragraph

Claims 1-26 stand rejected under 35 U.S.C. § 112, first paragraph because the specification, while being enabling for a carbon nanocapsule thin film having a carboxyl functional group, does not allegedly provide enablement for any other functional groups. Applicants respectfully traverse this rejection.

As disclosed in page 5, lines 9-24 of the specification, the carbon nanocapsules of the invention comprises a functional group, for example, a functional group that carries at least one positive charge after dissociation in the electroplating solution. The types of functional groups are, for example, amine or quaternary ammonium group. Furthermore, the carbon nanocapsules further comprises a functional group that carries at least one negative charge after dissociation in

the electroplating solution. The types of functional groups are, for example, carboxyl group, SO_4^- or PO_4^- .

Although the embodiment provides a carbon nanocapsule thin film having a carboxyl functional group, the other functional groups as the above recitation also can be added to the carbon nanocapsule for one skilled in the art. For example, the Examiner is referred to 1) Y.M. Li, et al, "Proton conductivity of phosphoric acid derivative of fullerene", Elsevier, *Solid State Ionics*, 2002, vol. 150, pp. 309-315; 2) T.H. Goswami et al., "A selective reaction of polyhydroxy fullerene with cycloaliphatic epoxy resin in designing ether connected epoxy star utilizing fullerene as a molecular core" Elsevier, *Polymer*, 2003, vol. 44, pp. 3209-3214; 3) F. Wall, "Fullerene Materials", *J. Mater. Chem.*, 2002, vol. 12, pp. 1959-1963; 4) M. Prato, "Fullerene chemistry for materials science applications", *J. Mater. Chem.*, 1997, vol. 7, no. 7, pp. 1097-1109; 5) S. Chuang et al, "Synthesis and Chemistry of Fullerene Derivatives Bearing Phosphorus Substituents. Unusual Reaction of Phosphines with Electron-Deficient Acetylenes and C_{60} ", *J. Org. Chem.*, 1999, vol. 64, pp. 6664-6669; and, 6) L.Y. Chiang, "Efficient One-Flask Synthesis of Water-Soluble [60]Fullerenols", Pergamon, *Tetrahedron*, 1996, vol. 52, no. 14, pp. 4963-4972, which provide disclosure of the other functional groups as the above recitation can be bonded on the carbon nanocapsule by a double bond addition reaction via the double bonds on the surface of the carbon nanocapsule. Accordingly, the other functional groups such as amine or quaternary ammonium group, SO_4^- or PO_4^- can be bonded on the carbon nanocapsule.

Moreover, Applicants are not required to provide exhaustive examples in order to enable the scope of the present claims. The Examiner has completely failed to present a case of lack of enablement and simply notes that two examples are provided.

The enablement requirement of 35 U.S.C. §112, first paragraph requires that the specification teach one of ordinary skill in the art how to make and use the claimed invention without undue experimentation. The determination of whether an invention requires undue experimentation is not based on a single factor, but is rather a conclusion reached by weighing many factors. The dominant factors have been summarized as follows:

1. the quantity of experimentation necessary (time and expense);
2. the amount of direction or guidelines presented in the application;
3. the presence or absence of working examples of the invention in the application;
4. the nature of the invention;
5. the state of the prior art;
6. the predictability or unpredictability in the art; and
7. the breadth of the claimed invention.

In re Wands, 858 F.2d 731, 8 USPQ2d 1400, 1404 (Fed. Cir. 1988).

However, the fact that experimentation may be complex does not necessarily make it undue if a person skilled in the art typically engages in such experimentation. In re Borkowski, 422 F.2d 904, 164 USPQ 642, 645 (CCPA 1970). The test for enablement is not whether experimentation is necessary, but rather the test is if experimentation is necessary, is it undue? In re Angstadt, 537 F.2d 498, 190 USPQ 214, 219 (CCPA 1976).

Reconsideration and withdrawal of the 35 U.S.C § 112 rejection are respectfully requested.

Issues Under 35 U.S.C. § 103(a)

Claims 1-7, 11-20 and 24-26 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nakamoto, US 2002/0060514 (hereinafter referred to as Nakamoto '514) and Hinokuma, US 2002/0187403 (hereinafter referred to as Hinokuma '403).

Further, claims 1-4, 9-12, 14-17 and 22-25 stand rejected under 35 U.S.C. § 103(a) as being obvious over Hwang, US 2004/0126303 (hereinafter referred to as Hwang '303) and Nakamoto '514.

Applicants respectfully traverse these rejections.

Applicants submit that claims 2 and 15 have been cancelled, therefore withdrawal of the rejection for these claims is respectfully requested.

Rejection based upon Nakamoto '514 and Hinokuma '403

Claim 1 is directed to a carbon nanocapsule thin film, prepared by electroplating a plurality of carbon nanocapsules onto a substrate, wherein the carbon nanocapsules comprise a functional group and the functional group carries at least one charge after dissociation, and the *carbon nanocapsule is a polyhedral carbon cluster constituted by having concentric multi-layers of closed graphitic sheet structure* and the *diameter of the carbon nanocapsule is about 3-100 nm*.

Claim 14 relates to a carbon nanocapsule thin film preparation method, comprising:
providing a substrate; and

electroplating a plurality of carbon nanocapsules onto the substrate, wherein the carbon nanocapsules comprise a functional group and the functional group carries at least one charge after dissociation, and the *carbon nanocapsule is a polyhedral carbon cluster constituting multiple graphite layers having a balls-within-a ball structure*, and the *diameter of the carbon nanocapsule is 3-100 nm*.

Nakamoto '514 and Hinokuma '403 fail to disclose a carbon nanocapsule having the specific structure claimed. Nakamoto '514 and Hinokuma '403 also fail to disclose the diameter of a carbon nanocapsule of about 3-100 nm.

As disclosed in page 3, line 24 to page 4, line 2 of the claimed invention, the charged functionalized carbon nanocapsules can be uniformly electroplated onto a substrate to form a carbon nanocapsule thin film. As disclosed in page 4, lines 24-28 of the claimed invention, the carbon nanocapsule is a polyhedral carbon cluster constituted by having concentric multi-layers of closed graphitic sheet structure, and the diameter of a carbon nanocapsule is 3-100 nm.

However, as disclosed in paragraph [0047] of Nakamoto '514, Nakamoto '514 only discloses fullerenes or carbon nanotubes. The abstract of Hinokuma '403 discloses only a carbonaceous material derivative, such as a fullerene derivative, a carbon cluster derivative or a tubular carbonaceous material derivative.

Referring to Chiang (US 6,020,523), Withers (US 2002/0100578), Nakamoto '514 and Hinokuma '403, fullerene is a single layered carbon cluster having a diameter of about 1 nm and carbon nanotube is a single layered carbon tube. In addition, one skilled in the art appreciates that carbon nanotubes have a high molecular weight which cannot be dissolved in a solution for electroplating on a substrate. However, the carbon nanocapsule of the claimed invention can be

dissolved in a solution for electroplating on a substrate. Accordingly, one skilled in the art appreciates that the fullerenes and carbon nanotubes of Nakamoto '514 and the carbonaceous material derivative of Hinokuma '403 are different from the carbon nanocapsule of the claimed invention.

Indeed, Nakamoto '514 and Hinokuma '403 neither teach or suggest the limitations of "the carbon nanocapsule is a polyhedral carbon cluster constituted by having concentric multi-layers of closed graphitic sheet structure and the diameter of the carbon nanocapsule is about 3-100 nm" and "the carbon nanocapsule is a polyhedral carbon cluster constituting multiple graphite layers having a balls-within-a ball structure, and the diameter of the carbon nanocapsule is 3-100 nm" of claims 1 and 14, respectively. Thus, Applicants submit that claims 1 and 14 are novel and non-obvious over Nakamoto '514 and Hinokuma '403. Insofar as claims 3-7, 11-13 and claims 16-20, 24-26 depend from claims 1 and 14, respectively, these claims are also allowable at least by virtue of their dependency.

Rejection based upon Hwang '303 and Nakamoto '514

Hwang '303 has been cited in a rejection under 35 U.S.C. § 103(a), but should be excluded as prior art under 35 U.S.C. § 103(c). Specifically, Hwang '303 only qualifies as prior art under 35 U.S.C. § 102(e)/103(a) as of the U.S. filing date of June 27, 2003. However, the present application and Hwang '303 are owned by the same Assignee, Industrial Technology Research Institute.. This is true from at least the time the claimed invention was made, and is evidenced by the filing and recording of assignments in the USPTO, as follows:

<u>Application</u>	<u>Reel/Frame</u>	<u>Recording Date</u>
Hwang '303	014240/0284-0285	June 27, 2003
Present Application	15899/0235-0236	October 19, 2004

In this respect, 35 USC § 103(c) specifies as follows:

c) (1) Subject matter developed by another person, which qualifies as prior art only under one or more of subsections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the claimed invention was made, owned by the same person or subject to an obligation of assignment to the same person.

Accordingly, the cited Hwang '303 reference is not citable against the instant claims under the provisions of 35 USC § 102(e)/103(a), and withdrawal of the outstanding rejection is required.


In view of the above, Applicants believe that the pending application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Craig A. McRobbie, Reg. No. 42,874, at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

Dated: AUG 21 2009

Respectfully submitted,

By 

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Attachments:

- 1) Y.M. Li, et al, "Proton conductivity of phosphoric acid derivative of fullerene", Elsevier, *Solid State Ionics*, 2002, vol. 150, pp. 309-315;
- 2) T.H. Goswami et al., "A selective reaction of polyhydroxy fullerene with cycloaliphatic epoxy resin in designing ether connected epoxy star utilizing fullerene as a molecular core" Elsevier, *Polymer*, 2003, vol. 44, pp. 3209-3214;
- 3) F. Wall, "Fullerene Materials", *J. Mater. Chem.*, 2002, vol. 12, pp. 1959-1963;
- 4) M. Prato, "Fullerene chemistry for materials science applications", *J. Mater. Chem.*, 1997, vol. 7, no. 7, pp. 1097-1109;
- 5) S. Chuang et al, "Synthesis and Chemistry of Fullerene Derivatives Bearing Phosphorus Substituents. Unusual Reaction of Phosphines with Electron-Deficient Acetylenes and C₆₀", *J. Org. Chem.*, 1999, vol. 64, pp. 6664-6669; and,
- 6) L.Y. Chiang, "Efficient One-Flask Synthesis of Water-Soluble [60]Fullerenols", *Pergamon, Tetrahedron*, 1996, vol. 52, no. 14, pp. 4963-4972